

# **Assessing Body Mass Index (BMI) in Schools**



**Tennessee Department of Health  
Nutrition Services & WIC**

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**Special Thanks to the Coordinated School Health Program  
This Manual adapted from the  
Coordinated School Health Program BMI Protocol Manual**

## **Implement Six Safeguards Before Conducting Weight Screening**

Screening children to identify potential weight problems can contribute to positive health outcomes but, if done without sensitivity, can have negative effects on emotional well-being. On the positive side, students at both ends of the weight spectrum can be objectively identified and referred for additional evaluation and possible intervention. On the negative side, weight screening that results in labeling a child as "too fat" or "too thin" can damage self-esteem and may increase susceptibility to eating disorders. The decision to conduct weight screenings should be made by the local school board after careful review of proposed screening procedures. Schools should not initiate weight screening unless the following six safeguards are in place:

### **Safeguard 1: Learning Environment**

Schools have fully implemented the recommendations for *Creating A Safe and Supportive Learning Environment* by implementing a Coordinated School Health Initiative.

### **Safeguard 2: Classroom Instruction**

Teachers have instructed students in a way that counteracts social pressure for excessive slenderness and enhances the students' understanding of the healthy weight concept.

Important concepts that need to be conveyed to students include:

- There are different body types; some body types are naturally associated with more body weight.
- A range of weights is normal. People can be healthy at many weights and look very different from one another.
- It is not normal and it is not possible for every person to be the same size and shape.
- Students have the ability to make healthy food choices.
- Daily physical activity contributes to overall health and healthy weight.
- Sedentary behaviors can contribute to weight gain.
- Normal growth and development patterns affect body shapes and sizes, especially at puberty.
- Subtle media messages suggesting that only thin people are happy or attractive should be challenged.

### **Safeguard 3: Parental Permission**

A system is in place to notify parents of impending weight screening and to obtain parental permission for the weight screening. Make sure that all signed parent forms are on file. Parental involvement is critical. Invite parents to a meeting to

discuss if necessary. Preparation on the front end will ensure a minimum of problems later.

#### **Safeguard 4: Referral System**

A system is in place for referring students for further evaluation and help. It is inappropriate and possibly harmful to identify a child as having a potential problem with weight unless some source of referral for further assessment and help can be offered.

#### **Safeguard 5: Staff Training**

All school staff participating in weight screenings have received training and have demonstrated proficiency in screening techniques and interpretation of screening results.

#### **Safeguard 6: Respectful Screening**

A screening process has been designed that protects the self-esteem of students: avoid labeling students. Whatever the results of the weight screening, school personnel should not label any child as overweight, obese, underweight, too thin or anorexic. For the purpose of school weight screening, if a child's Body Mass Index-for-Age (BMI) exceeds the 85<sup>th</sup> percentile or falls below the 5<sup>th</sup> percentile on the BMI-for-Age growth chart, the Healthy Weight Advisory Group recommends the wording, "weight which may place a child at health risk". Maintain privacy in the assessment process. Only the person screening the student observes the results. For example, the screener can use an office or a screen to help maintain privacy. Height and weight should not be announced.

The results of the screening should be kept confidential. For younger children in grades K-3, the teacher should not tell the students the results of the screening. Results should only be shared with the child's parents. Younger students do not have the cognitive skills to process the results and use them to shape personal behavior. Consider not sharing the information with any student.

A respectfully worded letter should be developed to notify parents if a child's weight may present a health risk. The letter should not label the child but should request that the parents seek further assessment by a health care professional. Parents should be sent a letter when the student's weight falls below the 5<sup>th</sup> percentile or above the 85<sup>th</sup> percentile on the BMI-for-Age charts published by the Centers for Disease Control and Prevention ([www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm](http://www.cdc.gov/nccdphp/dnpa/bmi/bmi-for-age.htm)).

No comments on weight should be offered during the measurement process. Neutral comments such as, "Thanks, you can get off the scale now," are appropriate. Younger children and students who are anxious about the weighing process can be positioned with their backs to the scale during measurement. If a student makes a negative remark about his or her own weight, it is appropriate to respond with a supportive response such as, "Good bodies come in all shapes and sizes". All students should undergo the same measurement procedures. No one child should be singled out for additional measurements because of physical appearance or weight. To minimize teasing, all students should line up in the screening area, even if their parents have excused them from the screening process.

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# Resources

## **Gathering Essential Resources**

The resources essential to this project fall into three categories: Community Involvement, Data Collection Personnel, and Equipment.

Before any data is collected, the participation and enthusiasm of the community should be solicited to insure validation of the process and interest in the results. It is imperative that school system administration and school administration are supportive of the system and willing to participate. The recommended partners are suggested resources for logistics of data collection and management, and are not limited to those listed.

### **Resources**

#### **A Recommended Partners**

- Local Health Councils
- School administration
- Hospitals
- Local health department
- PTA/PTO
- Parent volunteers
- School psychologist/guidance counselor
- UT Extension
- Local institutions of higher education

#### **B Data Collection Personnel**

1. Minimum of 2 needed with cooperation of classroom teacher (see Data Collection section for specific job assignments)
2. Training (see Training section)
3. Personnel suggestions
  - Health educators
  - Nutrition Staff
  - School Nurse
  - PE/Health/Wellness Teachers
  - College Students
  - Parent/Community volunteers

#### **C Equipment**

1. Scale
2. Scale calibration weights
3. Stadiometer (measures height)
4. Data collection form (found in Data Collection section)
5. Privacy screen
6. Lock box for data storage
7. Parental permission request form
8. Measurement follow-up parent letters (found in Data Management section)
9. Quality assurance notebook (found in Quality Assurance section)

\_\_\_\_\_ **COUNTY SCHOOLS**

Date: \_\_\_\_\_

Dear Parent or Guardian,

Throughout the \_\_\_\_\_ school year, the \_\_\_\_\_ school system will be offering health screening to all students in the appropriate grade levels. Trained school personnel and parent volunteers will complete all screenings with strict adherence to confidentiality of each child and adolescent screened.

Blood Pressure  
Dental

Hearing\*  
Height/Weight

Lice\*  
Scoliosis

Vision\*

If we screen your child and find any deviations from a normal screening, we will contact you concerning this matter. Please note there will be no charge for these services.

IF YOU DO NOT WANT YOUR CHILD TO PARTICIPATE IN ANY OF THE FOLLOWING SCREENINGS, PLEASE COMPLETE AND SIGN THE FORM BELOW AND RETURN TO YOUR CHILD'S TEACHER. If you have any questions or concerns, please feel free to contact me at the number listed below.

Thank you.

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I Do Not want my child to participate in the following screenings (please check all that apply):

\_\_\_ Blood Pressure      \_\_\_ Dental      \_\_\_ Height/Weight      \_\_\_ Scoliosis

School Official's Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Child's Name: \_\_\_\_\_ Date: \_\_\_\_\_

Parent or Guardian's signature: \_\_\_\_\_

\* Required



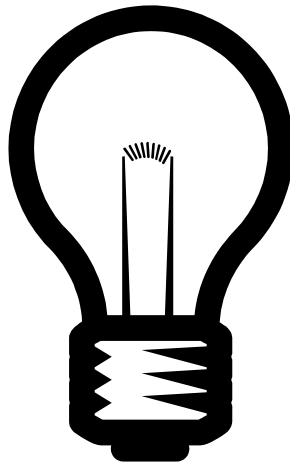
## **DO's and DON'TS of Talking to a Child with a Weight Problem**

### Do

- Provide information
- Make observations
- Ask questions
- Offer suggestions
- Be honest
- Tread lightly
- Provide support
- Praise their attributes
- Provide encouragement
- Listen

### Don't

- Lecture
- Be judgmental
- Have all the answers
- Reprimand
- Be manipulative
- Nag
- Threaten
- Tease
- Criticize
- Push



## **Website Resources**

This website list was compiled for parents, school personnel and interested individuals. The websites listed are reliable sources of nutrition, physical activity and weight management.

American Dietetic Association <http://www.eatright.org>

Arkansas BMI Project <http://www.achi.net/>

Center for Health and Health Care in Schools – Parents Resource Center

<http://www.healthinschools.org/parents/index.htm>

Center for Health and Health Care in Schools – teen site

<http://www.healthinschools.org/students/>

The Center for Disease Control (CDC) <http://www.cdc.gov>

The CDC site for Healthy Youth <http://www.cdc.gov/HealthyYouth/index.htm>

Childhood Obesity: A Food and Nutrition Resource List for Educators and Researchers

<http://www.nal.usda.gov/fnic/pubs/bibs/topics/weight/childhoodobesity.html>

5 A Day for Better Health <http://www.5aday.com> and <http://www.5aday.gov>

4GirlsHealth <http://www.4girls.gov/index.htm>

Institute of Medicine: Preventing Childhood Obesity

<http://www.iom.edu/report.asp?id=22596>

My Food Pyramid <http://www.mypyramid.gov>

Tennessee Department of Education, Child Nutrition Programs <http://snp.state.tn.us>

Tennessee Department of Health <http://www.state.tn.us/health/>

UT Extension Service

<http://www.utextension.utk.edu/topics/FoodNutrition/default.asp>

United States Department of Health and Human Services – Child and Adolescent Health <http://www.ahrq.gov/child/>

United States Department of Agriculture/Agriculture Research Service Children's Nutrition Research Center at Baylor College of Medicine, Houston, Texas.

<http://www.bcm.edu/cnrc/bodycomp/bmiz2.html>

Weight Control Information Network: Helping Your Overweight Child

[http://win.niddk.nih.gov/publications/over\\_child.htm](http://win.niddk.nih.gov/publications/over_child.htm)

## Equipment Recommendations

The following list recommends and suggests which equipment to purchase for use in weighing and measuring children 2 years of age and older, especially when substantial numbers of individuals are to be assessed and the equipment is to be moved from facility.

Questions to consider when purchasing and using equipment: Why is it important to weigh and measure participants accurately? Consider the impact the values will have on the person involved.

Accuracy is essential as the values are frequently used to calculate the Body Mass Index (BMI). With the increased application of BMI as an indicator of the 'health status' of populations, it is essential we obtain correct values.

The process of obtaining measures has two steps:

1. measure
2. record

If the measure is erroneous, then the calculation of the BMI is also erroneous. It is important to have the date, age, and actual measurements recorded so the data may be used by others or at a later point in time. **Health decisions and potential interventions may subsequently be based on these physical measurements; hence accurate and reliable measures are vital to provide true estimates of the status of the population under consideration.**

The following suggestions are offered as a guide when purchasing acceptable equipment. You may have other manufacturers of such equipment but make sure they are equal or better with respect to accuracy and reproducibility of those listed. Take into account, some general considerations when potential purchases are being reviewed:

1. Check if the equipment is guaranteed against defects for one year or more (some items are under warranty for up to 3 years).
2. Negotiate a price reduction if possible.
3. Check whether the company has a 30-day return policy and who to contact for repairs if needed.
4. Before purchasing any equipment, check if there is a maintenance agreement and if there is an added cost for this service.
5. Check to see if you can locate other agencies that have purchased the same equipment and find out if they have had problems with the equipment or the supplier.

## **EQUIPMENT CONSIDERED EFFICIENT AND "USER FRIENDLY" FOR MEASUREMENT OF WEIGHT AND HEIGHT**

### **SCALES**

<b><u>BRAND &amp; MODEL</u></b>	<b><u>TECHNOLOGY &amp; CAPACITY</u></b>	<b><u>MANUFACTURER</u></b>
Seca 770	Electronic, 440 pounds, digital	Seca Corporation 1352 Charwood Road Suite E Hanover MD 21076 1-800-542-7322
Seca 881	Electronic, 440 pounds, digital	Seca Corporation
Seca 881	Electronic, 440 pounds, digital	Seca Corporation
Seca 880	Electronic, 440 pounds, digital	Seca Corporation
Seca 841	Electronic, 330 pounds, digital	Seca Corporation
Seca 840	Electronic, 330 pounds, digital	Seca Corporation
<i>*Seca Scales listed above have a 2 year warranty</i>		
Tanita BWB 800S	Electronic, 440 pounds, digital	Tanita Corp. of America 2625 S. Clearbrook Drive Arlington Heights, IL 60005 1-877-682-6482
<i>*This product has a 3 year manufacture warranty. This does not cover calibration but if the product is found out of calibration it should be shipped to the company to be re-calibrated for an additional cost.</i>		
Tanita HD-351	Electronic, 440 pounds, digital	Tanita Corp. of America 2625 S. Clearbrook Drive Arlington Heights, IL 60005 1-877-682-6482
Tanita HS-301	Solar, 330 pounds	Tanita Corp. of America
<i>*Neither of these latter Tanita scales carries a warranty. They are not rated as professional and only suitable for home use.</i>		

## **STANDING MEASURING UNITS**

### Portable Stadiometers

<u>BRAND &amp; MODEL</u>	<u>TECHNOLOGY &amp; CAPACITY</u>	<u>MANUFACTURER</u>
Seca 214	portable	Seca Corporation 1352 Charwood Road Suite E Hanover MD 21076 1-800-542-7322
Seca 225	Freestanding platform and transport castors	Seca Corporation
Perspective Enterprises PE-AIM-101	Portable	Perspective Enterprises Portage MI 1-800-323-7452

## **PRIVACY SCREENS**

<u>BRAND &amp; MODEL</u>	<u>SPECIFICATIONS</u>	<u>MANUFACTURER</u>
Portable Room Divider		Port-A-Wall 1053 Home Run Lane Bedford, VA 24523 1-866-802-0217 <a href="http://www.portawall.com">www.portawall.com</a>
Model 313	Overall Height 69"	Pro-med Products 1-800-542-9297
Model 363	Overall Height 69"	Pro-med Products
Omnimed Beam Economy Folding Screen		Medical Resource USA 1-800-330-3591 <a href="http://store.medicalresourceusa.com">http://store.medicalresourceusa.com</a>
Winco 363 Folding Three- Panel Screen		Medical Resource USA
Winco 364 Folding Four-Panel		Medical Resource USA

## **CALIBRATION WEIGHTS**

<b><u>BRAND &amp; MODEL</u></b>	<b><u>SPECIFICATIONS</u></b>	<b><u>MANUFACTURER</u></b>
Calibration weights	Precision weights, magnetic susceptibility >.01	Troemner 1-800-249-5554 www.troemner.com
Calibration weights	Meets ASTM specifications	Scientech 1-978-521-7095 sales@balances.com
Test Weights	Meets ASTM specifications	Seca Corporation 1352 Charwood Road Suite E Hanover MD 21076 1-800-542-7322

## **LOCK BOX**

Any type of lock box can be used. The only requirement is that it locks, in order to keep all measurements confidential.

# Volunteer Resources

## Resources for Volunteers Summary Sheets

### Definitions

BMI – Body Mass Index

$$\text{BMI} = \frac{(\text{Weight in Pounds})}{[(\text{Height in Inches} \times \text{Height in Inches})]} \times 703$$

$$\text{BMI} = \frac{(\text{Weight in Kilograms})}{(\text{Height in Meters} \times \text{Height in Meters})}$$

External Auditory Canal – passageway that leads from the outside of the head to the tympanic membrane, or eardrum membrane of each ear.

Frankfort Plane – imaginary line passing through the external ear canal and across the top of the lower bone of the eye socket, immediately under the eye

Medial Border – Relating to the middle or center

Orbital Margin – the top of the lower bone of the eye socket

Scapulae – Two large, flat, triangular bones forming the back part of the shoulder; also called the shoulder blade

Stadiometer – Instrument for measuring standing height

Useful Formulas:    1 pound = 2.2 kilograms  
                             1 inch = 2.54 centimeters  
                             1 meter = 100 centimeters



## Volunteer "Cheat Sheet" for Measurement Procedures

*\*Copy these two "summary" pages for volunteers to use as a "cheat sheet" when weighing and measuring children.*

*The Data Collection section also contains helpful resources for volunteers.*

### **Summary of Measurement Procedures**

- Set up measurement stations with the appropriate equipment
  - Privacy Screen to keep process confidential
  - Stadiometer
  - Scale
  - Quality Assurance Notebook
  - Calibration weights
  - Lock Box
- Calibrate the scales and record data in the quality assurance notebook
- Prepare the child for measures
  - Remove shoes, glasses, jewelry and any extra clothing such as jackets
  - Empty pockets
- Measure the child
  - Height in inches
  - Weight in pounds
  - Record data on data collection form
  - Check that all data is recorded on data collection form and place form in lock box
- Instruct child to return to his/her teacher/classroom

### **Summary of Weight Measurement**

- “Zero” the scale (if digital)
- Child steps up on the center of the scale and stands in the direction as to not see their individual weight on the scale
- Body weight is evenly distributed between both feet
- Arms hang freely by the sides of the body, palms facing thighs
- Head is up and facing straight ahead
- Weight is recorded to the nearest 0.2 pounds (or appropriate unit for the scale)

### **Summary of Height Measurement**

- Child stands with back against the board (or whatever part of the body touches the board first; may be more than one body part)
- Child’s heels, buttocks, shoulders and head are touching a flat upright surface
- Body weight is evenly distributed on both feet
- Arms hang freely by the sides of the body, palms facing the thighs
- Legs are placed together, bringing knees or ankles together
- Child stands erect; head is up and facing straight ahead
- Verify body position front and left
- Position head in Frankfort Plane
- Child inhales deeply WITHOUT moving head or body
- Bring headpiece down onto the upper most point on the head; compress the hair
- Height is recorded to the nearest 1/8 inch (or appropriate unit for the stadiometer)

# Training

## Training for Reliable Results

The Training section of the surveillance system is intended to provide for accurate, proficient, **sensitive** data collectors. These standardized training tools will assist system administrators in training new personnel. The objectives for training are: standardization of methods for measurement and **sensitivity** in addressing questions and comments from the student being measured.

There are step-by-step training modules included in this section. They cover individually the topics of standardizing accurate measurement techniques, **assurance of accuracy of scales through calibration**, and appropriate ways to address student questions and comments.

Along with training, data collection personnel will sign a confidentiality statement that will then be kept on file in the Quality Assurance Notebook.

## **Accurately Weighing and Measuring Children and Adolescents**

### **Introduction**

As we begin the process of collecting BMI data in schools, there are a few key concepts that need to be explored. In collecting data, the most important factors are to develop reliable techniques, to use calibrated equipment, and to perform accurate measurements.

This module reviews equipment and techniques for measuring and recording height and weight for children and adolescents.

### **Objectives**

At the conclusion of this module, participants will:

- Identify appropriate measuring equipment
- Demonstrate appropriate techniques for measuring weight and height for children and adolescents

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## 1. SCALES FOR WEIGHING CHILDREN AND ADOLESCENTS

Spring balance scales such as bathroom scales should not be used to weigh children or adolescents. These scales are not accurate over a variety of weights and the spring counter balance loses accuracy over time. Many spring balance scales can not be read accurately to less than one-half pound. The reading of bathroom scales is often distorted since the dial is on the floor rather than at eye level.

A suitable scale is a quality beam balance or electronic scale that can be easily calibrated.



- Equipment must be used for the purpose for which it was designed
- No bathroom scales to weigh children or adolescents
- A scale for weighing children and adolescents should be a quality beam balance or electronic scale

An accurate scale for weighing children and adolescents can be either beam balance or electronic. It is desirable that the scale weigh in 100 gram or ¼ pound increments. Safety and accuracy dictate that the scale has a large enough platform for support of the individual being weighed.

The scale should have a function so that it can be “zeroed”. Standard weights should be available to calibrate the scale. Beam balance scales should have “screw type” provision for immobilizing the zeroing weight. Length devices attached to scales are notably inaccurate because they do not have a stable platform.

- Quality beam balance or electronic
- Weighs in 0.1 kg (100 gm) or ¼ lb increments
- Stable weighing platform
- Can be easily “zeroed”
- Can be calibrated
- No stature/height measuring device attached

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## 2. STADIOMETERS FOR MEASURING CHILDREN AND ADOLESCENTS

Stadiometers are available in two types. The first type is permanently fixed to the wall. The second type is portable. The most common failing of a portable stadiometer is a base that is too small. When the base is too small, the stadiometer is not stable and entirely perpendicular to the floor.



- Equipment must be used for the purpose for which it was designed
- No tapes, yardsticks or graphics attached to the wall
- No carpet under stadiometer
- Stadiometer must be stable, calibrated and dedicated to the purpose

An accurate stadiometer for stature/height measurements is designed for and dedicated to stature measurement. An appropriate stadiometer requires a vertical board with an attached metric rule and a horizontal headpiece that can be brought into contact with the most superior part, or top, of the head. The stadiometer should be able to read to 0.1 cm or 1/8 in.



A stadiometer for stature measurements requires:

- A vertical board with an attached metric rule
- A horizontal headpiece that can be brought into contact with the most superior part of the head

Although it would seem efficient to use a stature device attached to a scale, height attachments on scales are never used. They are inaccurate – because they do not provide a firm platform for the measurement – they are relatively sharp, and thus pose a risk for harm to the person being measured.

**It is inappropriate to measure stature with the moveable measuring rod on platform scales.** The headpiece is unsteady and too narrow and the base (weighing platform) will sink because of the weight of the individual.

☐ **Height attachments on scales are never used**

- Inaccurate
- Dangerous

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### 3. ASSURING ACCURATE, RELIABLE EQUIPMENT

**Maintenance** is a regular, daily event.

- It requires that scales be checked and “zeroed” before each daily screening.
- It requires that stadiometers be checked and “zeroed” before each daily screening.

**Calibration** is a daily event.

- It requires that scales be “tested” with standard weights on at least a daily basis.
- It requires that movable scales be calibrated after each time the scale is moved.
- It requires that moveable stadiometers be checked with standard rods after each time the equipment is moved.

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#### **4. CRITICAL COMPONENTS**

The two most critical components of measuring are 1) accuracy and 2) reliability.

- Accuracy is defined as the degree to which a measurement of an individual corresponds to his or her actual weight or stature.
- Reliability is defined as the degree to which successive measurements of the same child agree within specified limits.

Both accuracy and reliability are to some degree a function of the quality of the equipment used for the measurements. Measurers are frequently expected to perform accurate and reliable measures on equipment which is not designed for performing accurate measurements. On the other hand, if appropriate equipment is available, it is often not properly maintained or is improperly used.

Often equipment is deemed to be expensive and is not purchased, or inferior or improvised equipment is used. Quality, easily calibrated and well maintained equipment is a good investment and will provide years of accurate and reliable service. Because quality equipment is durable, the seemingly high initial investment costs for quality equipment can be amortized over 20 or more years of service.

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## 5. Gathering Parameters of Measurement Accuracy

### Degree of refinement of a measure

The measurement is recorded to:

- Child weight: 0.01 kg, 10 gm, or ½ oz
- Child height: 0.1 cm or 1/8 inch

### Tolerance of a measure

Two measures should agree within:

- Child/adolescent weight: 0.1 kg, 100 gm, or ¼ oz
- Child/adolescent height: 1 cm or ¼ inch

To address quality assurance issues, there are two sets of numbers of interest.

The first set is the degree of refinement of a measure. That is, the degree to which a measure is recorded. For example, child weight is recorded to 0.01 kg, 10 grams, or ½ ounce. If a child was weighed to only 0.1 kg, 100 grams, or 3 ounces, a rate of weight gain of less than 100 grams would not be reflected in the measure.

The tolerance of a measure is the difference between two measures that is accepted as reasonable accuracy. The tolerance of a measure is generally larger than the degree of refinement of a measure. For example, the weight of a child is recorded as 3.12 kg and on re-measuring it is recorded as 3.13 kg. These measures are within an acceptable tolerance. If however, the child was weighed at 3.12 kg and a second measure was recorded as 3.11 kg, the average of the two closest measures would be recorded.

The tolerance of a measure is generally larger for measures of older children and adolescents because small changes are less critical for the interpretation of growth.

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## 6. WEIGHING CHILDREN AND ADOLESCENTS: EQUIPMENT AND CALIBRATION

It is assumed that the scale is appropriate for weighing a child or adolescent and is calibrated with a set of standard weights. It is important that the child or adolescent be weighed using procedures consistent with those by data collectors as other collection sites in order to establish accurate, reliable baseline data.

- A child older than 36 months is weighed standing on a scale.
- Use a calibrated beam balance or electronic scale
- Child must be able to stand without assistance.



### Weighing Children and Adolescents: Procedures

For all children, there is a need to respect privacy. Privacy includes where the measurements are taken, clothing removal, describing the measuring process, and interpreting the numbers.

- Child wears lightweight outer clothing.
- Child stands on center of platform scale, facing away from the scale.

**Weighing Children and Adolescents: Quality of Measurements**

The child is weighed wearing only lightweight clothing. The child stands on the center of the platform of the scale. For privacy, the child must be weighed facing in the direction so as not to see their individual weight on the scale.

The weight is recorded to the nearest 0.01kg or ½ oz.

The weight is recorded on the data form. The individual is repositioned and the weight measure is repeated.

The measures are compared; they should agree within 0.1 kg or ¼ lb.

If the difference between the measures exceeds the tolerance limit, the child should be repositioned and re-measured a third time. The average of the two measures in closest agreement is recorded.

- Reposition and repeat measure
- Measures should agree within 0.1 kg or ¼ lb

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## **7. MEASURING CHILD AND ADOLESCENT STATURE: EQUIPMENT AND PREPARATION**

Stature or height is measured for children over the age of 24 months who can stand unassisted. Accurate measurement of stature requires the use of a calibrated, vertical stadiometer with a movable headpiece, perpendicular to the vertical backboard.

- Measure stature for children over 24 months of age
- Use a calibrated vertical stadiometer with a right-angle headpiece
- The child is measured standing with heels, buttocks, shoulders and head touching a flat upright surface



## **Measuring Child and Adolescent Stature: Procedures**

The child or adolescent should stand on the footplate of the stadiometer without shoes. The person is positioned with heels close together, legs straight, arms at sides, shoulders relaxed. Ask the child to inhale deeply and to stand fully erect without altering the position of the heels. Make sure that the heels do not rise off the foot plate.

Lower the perpendicular headpiece snugly to the crown of the head with sufficient pressure to compress the hair. Hair ornaments, buns, braids, etc. may be removed to obtain an accurate measurement.

To ensure an accurate reading, the measurer's eyes should be parallel with the headpiece.

- Child or adolescent stands against stadiometer without shoes, with heels together, legs straight, arms at sides, shoulders relaxed
- Child looks straight ahead
- Bring the perpendicular headpiece down to touch the crown of the head
- Measurer's eyes are parallel with the headpiece

### **Measuring Child and Adolescent Stature**

- The measure is read to the nearest 0.1 cm or 1/8 in and recorded on the data form
- The person is repositioned and re-measured
- The measures should agree within 1 cm or 1/4 in

### **Children with physical disabilities**

Children with physical disabilities require specialized measuring equipment not appropriate for this type of screening. For example, a child with a cast or a child in a wheelchair. If you have any questions or concerns, contact Rubelyn Mays at 741-0275 or Roy Kice at 741-4055.



## **QUALITY ASSURANCE**

The main points of measurer quality assurance are straightforward.

First, set a date to train new data collectors.

Second, calibrate scales with standard weights.

The data collected that reflects attention to precision and accuracy of measurements by trained measurers will be very good documentation for assuring quality of data in reports and funding proposals.

### **Quality Assurance Notebook (see Quality Assurance section for samples)**

A notebook that contains documentation of quality assurance activities related to accurate weighing and measuring is a valuable tool. Once established this notebook should be kept in a permanent location near the weighing and measuring equipment. The notebook will be maintained on a regular basis as training, maintenance, and calibration activities are entered. Measurers will record data from training sessions and equipment calibration efforts. This data will then be available for measurers' self-monitoring of their accuracy.

The Quality Assurance Notebook contains:

1. Information related to appropriate equipment needed for accurate weighing and measuring
  - ✓ Equipment Checklists (see Tote Contents in Resources section)
2. Information related to equipment calibration and maintenance
  - ✓ Calibration Test Form
3. Information related to appropriate measurement techniques (contained in this training module)
  - ✓ Measurement Technique Checklist

## **Assuring Accuracy of Scales**

In order to assure accurate measurements, equipment must be periodically checked for function and accuracy. The following procedures for calibration and assessment of accuracy for scales should be performed each day before students are measured. A record of calibration and accuracy tests will be kept in a quality assurance notebook.

### **Calibration**

Electronic scales will come with calibration instructions from the manufacturer. If they do not, the manufacturer should be contacted and instructions requested.

### **Assessment of Accuracy of Scales**

Accuracy measures the closeness of the measurement to the true value. The accuracy of each scale will be assessed using:

1. Standardized known weights
2. Human subjects

The accuracy of each scales assessed using standardized known weights across a range of weights appropriate for the age/population group for which the equipment was made.

The average of the two measurements is taken to assess the accuracy of a particular scale.

A series of the weight of a volunteer is recorded and then a series of weights of the volunteer plus a series of known weights are used to construct a series of the averages.

Have a volunteer stand on the scale and record their weight.

Volunteer weight    1)  
                                 2)

Average the two readings =

Volunteer + 5 pounds    1)  
                                 2)

Average the two readings =

Volunteer + 10 pounds    1)  
                                 2)

Average the two readings =

Volunteer + 15 pounds    1)  
   2)  
   Average the two readings =

Volunteer + 20 pounds    1)  
   2)  
   Average the two readings =

Volunteer + 25 pounds    1)  
   2)  
   Average the two readings =

A fluctuation of +/- 0.2 pounds, or 100 grams, is acceptable. Anything greater means there is a mechanical problem and technical support should be consulted.

---

## 10. RATE YOURSELF ON MEASUREMENT TECHNIQUE

(Answers are provided on the following page)

### Question 1

At the end of the school year, all of the children in the classroom are weighed and measured again. Zach is being measured to evaluate his growth during the school year. Rate Zach's positioning for this stature measurement.



- ☐ Appropriate
- ☐ Inappropriate

### Question 2

Ashleigh's stature is measured at her Well Child visit. Rate her positioning for this measurement, noting particularly her head.



- ☐ Appropriate
- ☐ Inappropriate

### Question 3

Evan is also a client at the Child Health Clinic. He is seen regularly to monitor his weight. Rate Evan's preparation for being weighed.



- ☐ Appropriate
- ☐ Inappropriate

### Question 4

The personnel at the clinic are very aware of the need for precise measurements for children, so all children are weighed twice. Juanita also feels that accuracy is essential and uses standard weights to check the calibration of the scale when moved daily.



- ☐ Appropriate
- ☐ Inappropriate

## **Answers**

**Question 1:** The correct answer is "Inappropriate". His body is not vertical; stature should be measured without shoes, arms are not straight down sides, head not in correct position.

**Question 2:** The correct answer is "Inappropriate". The child's head is not in the Frankfort plane. The measure will be "tall".

**Question 3:** The correct answer is "Inappropriate". This adolescent is not standing in the center of the scale and privacy issues are being ignored; this child is not facing in the proper direction as not to see their individual weight on the scale.

**Question 4:** The correct answer is "Appropriate". Regular calibration of all scales should be routine and is necessary to ensure accurate measurements.

## References

Maternal and Child Health Bureau. "Accurately Weighing and Measuring: Developing and Rating Your Measurement Technique". Department of Health and Human Services.

(Online) <http://depts.washington.edu/growth/index.htm> July 2003

Maternal and Child Health Bureau. "Accurately Weighing and Measuring: Equipment". Department of Health and Human Services

(Online) <http://depts.washington.edu/growth/index.htm> July 2003

Maternal and Child Health Bureau. "Accurately Weighing and Measuring: Technique". Department of Health and Human Services.

(Online) <http://depts.washington.edu/growth/index.htm>. July 2003

# Data Collection



## **Steps for Recording Data**

*\*This sheet may be copied for as a "cheat sheet" for volunteers performing the measurements.*

1. Classroom teacher notes children who have permission to be measured on a class list. Teachers complete the ID# on the data form of children who have permission.
2. Students on list fill out name, birth date, today's date, gender, and race on data collection form (if too young, classroom teacher fills these fields out).
3. Students with permission are lined up outside of private screening area and classroom teacher gives a class list with names of children who have received parental permission to be measured to the weight/height collection personnel.
4. The weight/height collection personnel take data form from the first child in line, and checks that this child has permission to be measured.
5. If the child has permission to be measured, the weight/height collection personnel instruct the child to remove his/her shoes and any extra clothing. The weight/height personnel record the make and the model of the scale and the stadiometer used for measuring, on the data form.
6. The weight/height collection personnel measure the height of the child and record the height in inches on the data form.
7. The weight/height collection personnel weigh the child with number on the scale facing away from the child and record the weight in pounds on the data form.
8. The weight/height collection personnel instruct the child to replace shoes and extra clothing and report back to his/ her teacher/classroom.
9. The weight/height collection personnel put the data form in the lock box.
10. The weight/height collection personnel bring in the next child to be measured and start again at step 4.
11. Following completion of the measurements, the lock box containing all data forms will be locked and maintained by the school nurse or designee.

## Data Collection Form

Name: _____ (last, first)	ID# _____
Birth Date: _____ (mo/d/yr)	Date of measures: _____ (mo/d/yr)
Height: _____	Gender:       M       F (circle one)
Weight: _____	Race: (Circle one)
BMI: _____	White (non-Hispanic)
Percentile: _____	Black
	Hispanic
	Other
Scale Used for Measuring: Make _____ Model _____	Stadiometer Used for Measuring: Make _____ Model _____

### Data Collection Generating ID Numbers

- The ID number is an eight digit number.
- The first two numbers of the ID code should be the official county codes. Official county codes are listed later in this section.
- The second two numbers will be the student's grade. For grades K-9, the first digit will be a 0 followed by the number of the grade for the second digit (for example, 5<sup>th</sup> grade would be "05"). For grade Kindergarten, use a 0 to designate the grade. Therefore Kindergarten would be "00". For pre-kindergarten classes, use "99" for both of these digits.
- The last four numbers will be the student's last four digits of their social security number.

For example, a child in Williamson County who is in 5<sup>th</sup> grade with a social security number of 123-45-6789: ID# = 94-05-6789

A child in Maury County who is in Kindergarten with a social security number of 123-45-6789: ID# = 60-00-6789

**Instructions for Submitting BMI Data Collection Forms  
To Tennessee Department of Health**

Today's Date:	_____
School Name:	_____
School Mailing Address:	_____ _____
School Number:	__ _ _ _
School District:	_____

- 1. A copy of this form should be placed on the top of each group of BMI Data Collection forms that are mailed to the Tennessee Department of Health.**
- 2. All BMI Data Collection forms in the group should be from the same school.**
- 3. If more than one group of BMI Data Collection forms from the same school is submitted, place a copy of this form on top of each group.**
- 4. Mail forms to:**

**Tennessee Department of Health  
Nutrition Services/ WIC  
Attention: BMI Project  
425 5<sup>th</sup> Avenue North  
5<sup>th</sup> Floor, Cordell Hull Bldg.  
Nashville, TN 37247 - 5310**

## County Codes

Anderson 01  
Bedford 02  
Benton 03  
Bledsoe 04  
Blount 05  
Bradley 06  
Campbell 07  
Cannon 08  
Carroll 09  
Carter 10  
Cheatham 11  
Chester 12  
Claiborne 13  
Clay 14  
Cocke 15  
Coffee 16  
Crockett 17  
Cumberland 18  
Davidson 19  
Decatur 20  
DeKalb 21  
Dickson 22  
Dyer 23  
Fayette 24  
Fentress 25  
Franklin 26  
Gibson 27  
Giles 28  
Grainger 29  
Greene 30  
Grundy 31

Hamblen 32  
Hamilton 33  
Hancock 34  
Hardeman 35  
Hardin 36  
Hawkins 37  
Haywood 38  
Henderson 39  
Henry 40  
Hickman 41  
Houston 42  
Humphreys 43  
Jackson 44  
Jefferson 45  
Johnson 46  
Knox 47  
Lake 48  
Lauderdale 49  
Lawrence 50  
Lewis 51  
Lincoln 52  
Loudon 53  
McMinn 54  
McNairy 55  
Macon 56  
Madison 57  
Marion 58  
Marshall 59  
Maury 60  
Meigs 61  
Monroe 62  
Montgomery 63

Moore 64  
Morgan 65  
Obion 66  
Overton 67  
Perry 68  
Pickett 69  
Polk 70  
Putnam 71  
Rhea 72  
Roane 73  
Robertson 74  
Rutherford 75  
Scott 76  
Sequatchie 77  
Sevier 78  
Shelby 79  
Smith 80  
Stewart 81  
Sullivan 82  
Sumner 83  
Tipton 84  
Trousdale 85  
Unicoi 86  
Union 87  
Van Buren 88  
Warren 89  
Washington 90  
Wayne 91  
Weakley 92  
White 93  
Williamson 94  
Wilson 95

# Quality Assurance

### **Quality Assurance Notebook**

The Quality Assurance Notebook is a record of efforts made to insure the integrity of data collection. The notebook will consist of forms that record the weight/height collection personnel names and training and calibration of equipment. Copy the forms out of this section for use in your quality assurance manual.

Forms will be filled out by the weight/height collection personnel each day that data is collected. The first part of the daily form records the names of the weight/height collection personnel and what they will be doing at the collection site. Training dates for each member of the BMI team should be recorded on the Training Record page in the notebook. The next part of the daily form records the calibration efforts outlined in the "Assuring Accuracy of Scales" module of the training section.

## Daily Records Form

**Location:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### Data Collection Personnel Volunteering on this Day:

- 1.
- 2.
- 3.
- 4.

### Calibration Test:

Volunteer weight    1)  
                                     2)

Average the two readings =

Volunteer + 5 pounds    1)  
                                     2)

Average the two readings =

Volunteer + 10 pounds    1)  
                                     2)

Average the two readings =

Volunteer + 15 pounds    1)  
                                     2)

Average the two readings =

Volunteer + 20 pounds    1)  
                                     2)

Average the two readings =

Volunteer + 25 pounds    1)  
                                     2)

Average the two readings =

The scale is sufficiently accurate (fluctuation between averaged weights is less than 100 grams or 0.2 pounds) to measure students today:

YES

NO

Initials of assessor \_\_\_\_\_

## Data Collection Personnel Training Record

**School Name** \_\_\_\_\_

**Person Conducting Training** \_\_\_\_\_

Name:  
Organization:  
Training Date:

Name:  
Organization:  
Training Date:

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Training Date:



## **Tennessee Department of Education Confidentiality Statement**

By signing below, I am acknowledging my awareness of the requirements of the Health Insurance Portability and Accountability Act (HIPPA) and acknowledging and understand that, as a volunteer for the Department of Education's interests I am prohibited from releasing to any unauthorized persons any protected health information which may come to my attention in the course of my duties.

---

Signature

---

Date

---

Print Name

# Data Management

## Data Management

Following completion of measurements, it is up to school personnel to notify parents of children's results. To determine a child's BMI percentile for age and therefore weight status, go to the following website: <http://www.kidsnutrition.org/bodycomp/bmiz2.html> This is the site for the United States Department of Agriculture/Agriculture Research Service's Children's Nutrition Research Center at Baylor College of Medicine, Houston, Texas.

On this website, you will enter information for each child individually to obtain their results. A summary of that process is outlined below.

1. Start by assuring that the units of measurement are correct (pounds, kilograms).
2. Choose the gender, boy or girl.
3. Enter the child's age in years.
4. Enter the child's weight using the correct unit of measurement.
5. Enter the child's height using the correct unit of measurement.
6. Click on the button "calculate".
7. The results you receive back will include: the BMI, the BMI Percentile and the BMI Z-score.

Once you have determined the child's BMI percentile, you can complete the parent letter to be sent home in a sealed envelope. The sample letter follows on the next page.

1. Copy the letter onto school letter head.
2. For each child, complete the spaces for name, address, height and weight.
3. Record the child's BMI percentile which was obtained through the website.
4. Send the letter home in a sealed envelope.
5. You may include the web site resource list included in the "resource" section of this manual for parents to obtain further information.

***Once letters have been distributed, please send all data forms to the Tennessee Department of Health at the address below:***

Tennessee Department of Health  
Nutrition Services/WIC  
Attention: BMI Project  
425 5<sup>th</sup> Avenue North  
Cordell Hull Building, 5<sup>th</sup> floor  
Nashville, TN 37247-5310

## Dear Parent/Guardian

Your child participated in a Body Mass Index (BMI) screening at school. BMI is a screening tool that uses age, height, and weight to identify children who are at risk of developing health issues that occur from being or becoming overweight or underweight. It is important to measure BMI every year to see if your child is growing and developing in a healthy way.

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

HEIGHT: \_\_\_\_\_

WEIGHT: \_\_\_\_\_

Using Centers for Disease Control and Prevention guidelines, any child with a BMI below 5% is considered underweight. A BMI at or above 85% is at risk for being overweight, and a BMI of 95% or higher is considered overweight.

Your child's BMI% is: \_\_\_\_\_

These results are for screening purposes only. Please see your child's healthcare provider for a full medical evaluation of your child's health.

## Help Your Child Make Healthy Choices:

- Offer healthy snacks like fruits, vegetables, and low fat milk and milk products.
- Limit soft drinks, candy, and chips.
- Avoid serving portions that are too large.
- Limit television, video games, and computer time to no more than 2 hours a day.
- Take family walks, bicycle, run, or exercise with your child.
- For further information, contact your school for a resource list.

Healthy habits start early. Please be aware that diet, physical activity, and other health habits affect your child's health and life.